25 May 1970

Monitoring, File Processing and Computational Support to Missile and Space Related Systems

I. Introduction

Discussions were held with FMSAC, OSI, and OEL personnel. The emphasis in what follows is upon FMSAC related work. However, it is likely that as the sophistication of signal gathering equipments and techniques improves, many of the problems faced by FMSAC will similarly be faced by OSI, and that both FMSAC and OSI will have an interest in an appropriate distribution of activities among OEL and themselves and the field in the handling and processing of data.

There are three functional levels for FMSAC computer-related activities.

1) Monitoring of communications of interest to FMSAC

2) Maintenance of and information retrieval from FMSAC related files.

3) Computational support and data reduction.

II. Monitoring

The monitoring function is partially handled by scanning teletype traffic. This is done on a CDC 1700 computer where the information is passed against a 200 word dictionary to detect events of interest. These are then flagged and displayed at a

CRT station. Line printer output is also available. The computer
facility exists primarily to detect significant missile and space
events and to provide an on-line monitoring of these events. It
has some limited capability to manipulate data. In addition,
incoming data is recorded on magnetic tape for subsequent use in
AIDDISSEM report preparation on IBM 360 equipment.

III. Files

FMSAC related files are characterized as relatively small
with random access or serial batch characteristics.   25X1

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is the file with the greatest utilization. It contains about
90,000 80 column records with an annual growth rate of about
15,000 records per year - thus, about 7 million characters (if
not compacted) with an annual growth rate of over 1 million
characters. This is a quite modest file, and it would become
dramatically smaller if data compaction methods were used. (We
are not referring to sophisticated data compaction techniques but
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to such simple things as blank suppression, for example.) The
file is about 300,000 80 column physical records - again,
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a modest file. The remaining files are considerably smaller than
In a study performed in 1969, entitled Recommendations for
25X1 Improvement of FMSAC/AID Files,   recommended that a study be

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undertaken to review and reorganize files. We strongly concur in
this. It seems possible, for example, that [   ]
[   ] could be consolidated into one on-line file backed
up by a history file on tape. The recommended study should be
integrated into an Agency-wide development effort to provide
maintenance and retrieval capabilities for structured files.

Like many other computer based files in the Agency, those of
FMSAC are small, with a relatively modest growth rate. Fast
access will generally be required to facilitate on-line inquiry.
For this modest number of small files, with modest query levels,
a shared data processing system with on-line facilities seems
appropriate.

At the present time most fast access files are on the IBM
360/67 facility under TSMON with the IBM 360/65 being used for
large batch processing jobs. After about one year's usage, the
67 has not performed satisfactorily due to operating system and
equipment reliability problems. The system ~~was first tried under
TSS and now~~ is being run under CP/CMS. With the latter, users
have experienced severely degraded response time in file handling.
The Agency is now investigating an improved version of CP/CMS;
in addition, IBM has announced a new version of TSS.

At present, the 360/67 is being used primarily for program
development (quite successfully) with some limited file work also
being done, although its primary original purpose was as a file

support facility. When the 67 system has become reliable, in both a hardware and software sense, its use to support the multiple FMSAC-related files should be considered. The availability of CP/CMS would permit current file systems to be further refined while residing on the 360/65 and to be transferred to the 360/67 at an appropriate time.

Because of the importance of the specialized alerting function which the CDC 1700 performs, care should be taken not to add extraneous activities to this system. Future growth of this system should occur solely to enhance the scope and timeliness of functions presently performed. A system dedicated to space intelligence monitoring and linked to the main computation facility will be required for the foreseeable future.

Thus, work on revamping and consolidating FMSAC related files should be vigorously pursued for operation on the 360/65 with an understanding that these files might be transferred to the 360/67 if the conditions previously noted are met.

Historic files to replace folder files are now becoming feasible and should be the subject of an in-depth study. Use of microfilm COM systems are now state-of-the-art and developments in laser or electron beam recording for permanent very large storage is being vigorously pursued in the laboratory. Systems based on laser technology are already appearing and an accelerated

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pace of new systems announcements in this area can be expected within the next 3 years. This is a complex area from a systems viewpoint particularly with regard to data entry methods, retrieval criteria, retrieval facilities, and nature of stored material. A careful study is warranted.

IV. Computation Support and Data Reduction

There are two distinct types of large-scale FMSAC processing systems: (1) trajectory related and (2) signal preprocessing. The former has been well developed for some time and production programs exist. These are typically batch programs which are run on the 360/65. When the 360/67 becomes operational, the question may arise as to whether these programs should be run under CP/CMS on the 360/67. It seems doubtful that this would be worthwhile unless a substantial decrease in run time would result, and because of the simulation aspects of CP/CMS this seems unlikely. If only FMSAC computer needs are considered, it seems probable that a more scientifically oriented machine than the 360/65 would be a better fit for trajectory calculations - a machine such as those in the CDC 6000 or the UNIVAC 1100 series.

As the sophistication of surveillance sensors increases the need for an appropriate improvement in preprocessing capabilities for event identification will also increase. This probably will include the ability to handle larger traffic volumes than at present as well as sophisticated event detection. This general area is

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not treated in the documentation which we reviewed, and apparently is somewhat sensitive. Development will occur relatively slowly; i.e., a two year period should be adequate for review and planning. Since this activity would directly impact the methodology employed by an analyst, it will require very careful consideration to determine those functions which are presently the province of the analyst which can be handled by automated systems. It is likely that this general area could impact: field processing capabilities for on site data reduction, centralized data communications processing and scientifically oriented very large machine processing. In any case, it will cut across OEL/FMSAC/OSI lines as well as those between field and headquarters.

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STRUCTURED FILE SYSTEMS